

SYSEX DOCUMENTATION

Version 1.0 September 2002

ENGLISH

DDX3216

AUTOMATED DIGITAL MIXING CONSOLE



www.behringer.com

```
*****
Header :
*****
```

```
F0          System ex
00          0 = Manufact ID 2 bytes, 7E = USEM none Real Time, 7F = USEM Real Time
20          Behr. Man Id
32          "
ic          MIDI channel info
           i = 0AB0, A=1 ignore app ID, B=1 ignore midi channel (
omni )
           c = MIDI channel 0..F ( 1..16 )
dd          Apparatus id , 0B for DDX3216
rf          Function code: 0rffffff
           r = request bit  1= request 0= here's the data
           fffffff = function number 0..3F
           Function 20: parameter change
           Function 22: channel attenuation
```

```
-----
--/20 = do direct par change
-----
```

All changed controllers are send per frame within one System exclusive header
After the function code we have

nn number of changed parameters (min = 1, max = 23 / frame)

```
dd  A series of 4 bytes per parameter: 1e = module (channel) number
dd  2e = parameter number
dd  3e = parameter high 7 bit parameter value is 1:1
dd  4e = parameter low 7 bit
```

```
..
dd  Last parameter
dd
dd
dd
```

F7

```
-----
--/22 = do (group)channel attenuator
-----
```

All changed controllers are send per frame within one System exclusive header
After the function code we have

nn number of changed parameters (min = 1, max = 23 / frame)

```
dd  A series of 3 bytes per parameter: 1e = channel nr 0= chan 1 ( attenuates
all channels in same mute group )
dd  2e = parameter high 7 bit parameter value is 1:1
dd  3e = parameter low 7 bit
```

```
..
dd  Last parameter
dd
dd
```

F7

Ch. 1 - 32

no.	Parameter	switch	value range	value properties
1	Volume		0 - 1472	dB = -80 + value/16
2	Mute	X		
3	Pan		0 - 60	dB = -30 + value
4	Rout. to Main	X		
5	Rout. to Bus	X		
6	Bus Volume		0 - 1472	dB = -80 + value/16
7	Bus Volume Pre/Post	X		
8	Bus Pan		0 - 60	dB = -30 + value
9	Bus Pan Follow Channel	X		
20	EQ on	X		
21	EQ band 1 Filter type	X	0,1,2	0 = param. 1 = HC, 2 = HSh
22	EQ band 1 Frequency		0 - 159	Hz = 20 * pow (1000, value /159)
23	EQ band 1 Gain		0 - 72	dB = -18 + value/2
24	EQ band 1 Q		0 - 40	Q = 0.1 * pow (100, value /40);
26	EQ band 2 Frequency		0 - 159	Hz = 20 * pow(1000, value /159)
27	EQ band 2 Gain		0 - 72	dB = -18 + value/2
28	EQ band 2 Q		0 - 40	Q = 0.1 * pow (100, value /40);
30	EQ band 3 Frequency		0 - 159	Hz = 20 * pow (1000, value /159)
31	EQ band 3 Gain		0 - 72	dB = -18 + value/2
32	EQ band 3 Q		0 - 40	Q = 0.1 * pow(100, value /40);
33	EQ band 4 Filter type	X	0,1,2	0 = param. 1 = LC, 2 = LSh
34	EQ band 4 Frequency		0 - 159	Hz = 20 * pow(1000, value /159)
35	EQ band 4 Gain		0 - 72	dB = -18 + value/2
36	EQ band 4 Q		0 - 40	Q = 0.1 * pow(100, value /40);
37	High Pass on	X		
38	High Pass Frequency		0 - 80	Hz = 4 * pow(100, value / 80);
40	Compressor on	X		
41	Compressor Key	X	0-16	Channel 1-16 + self/sum
42	Compressor Attack		0-200	msec = value
43	Compressor Release		0-255	msec = 20 * pow(250, value / 255)
44	Compressor Ratio		0-15	1.0, 1.2, 1.4, 1.6, 1.8, 2.0, 2.5, 3.0, 3.5, 4.0, 5.0, 6.0, 8.0, 10.0, 20.0, 100.0
45	Compressor Knee	X	0-5	
46	Compressor Threshold		0-60	dB = -60 + value
47	Compressor Gain		0-24	dB = value
50	Gate on	X		
51	Gate Hold		0 - 255	msec = 10 * pow(100, value/ 255)
52	Gate Attack		0 - 200	msec = value
53	Gate Release		0 - 255	msec = 20 * pow(250, value / 255)
54	Gate Range		0 - 61	dB = -value (61 = -oo)
55	Gate Threshold		0 - 90	dB = -90 + value
60	Channel Delay on	X		
61	Delay Phase	X	0,1	normal,invert
62	Delay Time		0 - 115	sample = value * value
63	Delay Feedback		0 - 180	% = -90 + value
64	Delay Mix		0 - 100	% = value
70	Aux 1 send volume		0 - 1472	dB = -80 + value/16
71	Aux 1 pre/post	X		
72	Aux 2 send volume		0 - 1472	dB = -80 + value/16

73	Aux 2 pre/post	X		
74	Aux 3 send volume		0 - 1472	dB = -80 + value/16
75	Aux 3 pre/post	X		
76	Aux 4 send volume		0 - 1472	dB = -80 + value/16
77	Aux 4 pre/post	X		
80	FX 1 send volume		0 - 1472	dB = -80 + value/16
81	FX 1 pre/post	X		
82	FX 2 send volume		0 - 1472	dB = -80 + value/16
83	FX 2 pre/post	X		
84	FX 3 send volume		0 - 1472	dB = -80 + value/16
85	FX 3 pre/post	X		
86	FX 4 send volume		0 - 1472	dB = -80 + value/16
87	FX 4 pre/post	X		
	Bus 1-16			
1	Volume		0 - 1472	dB = -80 + value/16
2	Mute	X		
	Aux mast. 1-4			
1	Volume		0 - 1472	dB = -80 + value/16
2	Mute	X		
	FX mast. 1-4			
1	Volume		0 - 1472	dB = -80 + value/16
2	Mute	X		
90	FX type	X	0 - 26	see FX chapter
91	FX parameter 1		see FX chapter	see FX chapter
92	FX parameter 2		see FX chapter	see FX chapter
93	FX parameter 3		see FX chapter	see FX chapter
94	FX parameter 4		see FX chapter	see FX chapter
95	FX parameter 5		see FX chapter	see FX chapter
96	FX parameter 6		see FX chapter	see FX chapter
97	FX parameter 7		see FX chapter	see FX chapter
98	FX parameter 8		see FX chapter	see FX chapter
	FX Ret. 1-8			
1	Volume		0 - 1472	dB = -80 + value/16
2	Mute	X		
3	Pan		0 - 60	dB = -30 + value
4	Rout. to Main	X		
5	Rout. to Bus	X		
6	Bus Volume		0 - 1472	dB = -80 + value/16
7	Bus Volume Pre/Post	X		
8	Bus Pan		0 - 60	dB = -30 + value
9	Bus Pan Follow Channel	X		
70	Aux 1 send volume		0 - 1472	dB = -80 + value/16
71	Aux 1 pre/post	X		
72	Aux 2 send volume		0 - 1472	dB = -80 + value/16
73	Aux 2 pre/post	X		

74	Aux 3 send volume		0 - 1472	dB = -80 + value/16
75	Aux 3 pre/post	X		
76	Aux 4 send volume		0 - 1472	dB = -80 + value/16
77	Aux 4 pre/post	X		
	Master			
1	Volume		0 - 1472	dB = -80 + value/16
3	Balance		0 - 60	dB = -30 + value
20	EQ on	X		
21	EQ band 1 Filter type	X	0,1,2	0 = param. 1 = HC, 2 = HSh
22	EQ band 1 Frequency		0 - 159	Hz = 20 * pow (1000, value /159)
23	EQ band 1 Gain		0 - 72	dB = -18 + value/2
24	EQ band 1 Q		0 - 40	Q = 0.1 * pow (100, value /40);
26	EQ band 2 Frequency		0 - 159	Hz = 20 * pow (1000, value /159)
27	EQ band 2 Gain		0 - 72	dB = -18 + value/2
28	EQ band 2 Q		0 - 40	Q = 0.1 * pow (100, value /40);
32	EQ band 3 Frequency		0 - 159	Hz = 20 * pow (1000, value /159)
33	EQ band 3 Gain		0 - 72	dB = -18 + value/2
34	EQ band 3 Q		0 - 40	Q = 0.1 * pow (100, value /40);
36	EQ band 4 Filter type	X	0,1,2	0 = param. 1 = LC, 2 = LSh
37	EQ band 4 Frequency		0 - 159	Hz = 20 * pow (1000, value /159)
38	EQ band 4 Gain		0 - 72	dB = -18 + value/2
39	EQ band 4 Q		0 - 40	Q = 0.1 * pow (100, value /40);
40	Compressor on	X		
42	Compressor Attack		0-200	msec = value
43	Compressor Release		0-255	msec = 20 * pow (250, value / 255)
44	Compressor Ratio		0-15	1.0, 1.2, 1.4, 1.6, 1.8, 2.0, 2.5, 3.0, 3.5, 4.0, 5.0, 6.0, 8.0, 10.0, 20.0, 100.0
45	Compressor Knee	X	0-5	
46	Compressor Threshold		0-60	dB = -60 + value
47	Compressor Gain		0-24	dB = value
48	Fader pre/post Compressor	X		

DDX3216 SysEx parameter of FX algorithms

/***** Bypass *****/

Nr.	Name:	sysex value range:	parameter range:	scale :
90 = BYPASS		0		

Parameter :

91 = -
 92 = -
 93 = -
 94 = -
 95 = -
 96 = -
 97 = -
 98 = -

/***** Cathedral *****/

// Structure:

```
//
//                               /--o
// o-- PreDel - HiShv - Reverb
//                               |  \--o
//                               MOD
//
```

// PreDelay: Delays the whole reverb effect
 // Decay: Reverb time
 // Damping: Damping of high frequencies in %
 // Bass Multiply: Decay of low frequencies
 // Reverb Modulation: Modulation depth of reverb tail
 // Diffusion: Density of late reflections
 // Density: Density of early reflections
 // Hi-Shv Damp: Damping input High-Shelving

Nr.	Name:	sysex value range:	parameter range:	scale :
90 = CATHEDRAL		1		

91 = Decay	0 - 89	= 2 - 20 s	log
92 = Damping	0 - 100	= 0 - 100 %	lin
93 = Bass Multiply	0 - 100	= -50 - +50	lin
94 = Reverb Mod.	0 - 49	= 1 - 50	lin
95 = PreDelay	0 - 139	= 0 - 490 ms	log
96 = Density	0 - 50	= 0 - 50	lin
97 = Diffusion	0 - 20	= 0 - 20	lin
98 = Hi-Shv Damp	0 - 30	= 0 - 30 dB	lin

/***** Plate *****/

// Structure:

```
//
//          ----- M      G
//          /          /-- I -- A --o
```

```
// o-- FILTER -- ER -- REVERB      X      T
//          \          \-- E -- E --o
//          ----- R
//
```

// PreDelay: Delays the whole reverb effect
 // Decay: Reverb time
 // HiDec Damp: Damping of high frequencies in %
 // HiDec Freq: Frequency above the decay is damped
 // Diffusion: Density of late reflections
 // Stereo Width: Stereo width of late reflections
 // Hi-Shv Damp: Damping input high-shelving
 // Metal Res.: Adds a metal-type resonance

Nr.	Name:	sysex value range:	parameter range:	scale :
90 = PLATE		2		
Parameter :				
91 = Decay		0 - 90	= 1 - 10 s	log
92 = HiDec Damp		0 - 100	= 0 - 100 %	lin
93 = HiDec Freq		0 - 106	= 0.2 - 20 KHz	log
94 = Stereo Width		0 - 20	= 0 - 20	lin
95 = PreDelay		0 - 138	= 0 - 490 ms	log
96 = Metal Res.		0 - 20	= 0 - 20	lin
97 = Diffusion		0 - 20	= 0 - 20	lin
98 = HiShv Cut		0 - 30	= 0 - 30 dB	lin

/****** Small Hall *****/

// Structure:

```
//
//                               /--o
// o-- PreDel - HiShv - Reverb
//                               |  \--o
//                               MOD
```

```
//
// PreDelay:      Delays the whole reverb effect
// Decay:         Reverb time
// Damping:       Damping of high frequencies in %
// Bass Multiply: Decay of low frequencies
// Reverb Modulation: Modulation depth of reverb tail
// Diffusion:     Density of the late reflections
// Hi-Shv Damp:   Damping input high-shelving
// HiShv Freq:    Frequency of the input high-shelving
```

Nr.	Name:	sysex value range:	parameter range:	scale :
90 = SMALL HALL		3		
91 = Decay		0 - 34	= 0.5 - 1.2 s	log
92 = Damping		0 - 100	= 0 - 100 %	lin
93 = Bass Multiply		0 - 100	= -50 - +50	lin
94 = Reverb Mod.		0 - 49	= 1 - 50	lin
95 = PreDelay		0 - 76	= 0 - 100 ms	log
96 = Diffusion		0 - 20	= 0 - 20	lin
97 = HiShv Freq		0 - 53	= 1 - 10 KHz	log
98 = Hi-Shv Damp		0 - 30	= 0 - 30 dB	lin

/****** Room *****/

// Structure:

```
//
//                               /--o
// o-- PreDel - HiShv - Reverb
//                               \--o
```

```
//
// PreDelay:      Delays the whole reverb effect
// Decay:         Reverb time
// Damping:       Damping of high frequencies in %
// Bass Multiply: Decay of low frequencies
// Diffusion:     Density of the late reflections
// Mic Distance:  Position of the mics in the room
// Hi-Shv Freq:   Frequency of the input high-shelving
// Hi-Shv Damp:   Damping input high-shelving
```

Nr.	Name:	sysex value range:	parameter range:	scale :
90 = ROOM		4		
Parameter :				
91 = Decay		0 - 43	= 1 - 3 s	log
92 = Damping		0 - 100	= 0 - 100 %	lin
93 = Bass Multiply		0 - 100	= -50 - +50	lin
94 = Diffusion		0 - 20	= 0 - 20	lin
95 = PreDelay		0 - 92	= 0 - 150 ms	log
96 = Mic Distance		0 - 100	= 0 - 100	lin
97 = Hi-Shv Freq		0 - 53	= 1 - 10 KHz	log
98 = Hi-Shv Damp		0 - 30	= 0 - 30 dB	lin

/***** Concert *****/

// Structure:

```
//
//          ----- M      G
//          /          /-- I -- A --o
// o-- FILTER -- ER -- REVERB      X      T
//          \          \-- E -- E --o
//          ----- R
//
```

// PreDelay: Delays the whole reverb effect
 // Decay: Reverb time
 // HiDec Damp: Damping of high frequencies in %
 // Diffusion: Density of the late reflections
 // Hi-Shv Damp: Damping input high-shelving
 // ER/Rev-Balance: Level balance between early and late reflections
 // ER-Stereo Width: Stereo width of early reflections
 // Size: Size of the simulated room

Nr.	Name:	sysex value range:	parameter range:	scale :
90 = CONCERT		5		
Parameter :				
91 = Decay		0 - 90	= 0.8 - 8 s	log
92 = HiDec Damp		0 - 100	= 0 - 100 %	lin
93 = ER/Rev-Balance		0 - 100	= 0 - 100 %	lin
94 = Size		0 - 49	= 1 - 50	lin
95 = PreDelay		0 - 138	= 0 - 490 ms	log
96 = ER-Stereo Width		0 - 20	= 0 - 20	lin
97 = Diffusion		0 - 20	= 0 - 20	lin
98 = Hi-Shv Damp		0 - 30	= 0 - 30 dB	lin

/***** Stage *****/

// Structure:

```
//
//          ----- M      G
//          /          /-- I -- A --o
// o-- FILTER -- ER -- REVERB      X      T
//          \          \-- E -- E --o
//          ----- R
//
```

// PreDelay: Delays the whole reverb effect
 // Decay: Reverb time
 // HiDec Damp: Damping of high frequencies in %
 // Diffusion: Density of the late reflections
 // ER/Rev-Balance: Level balance between early and late reflections
 // Size: Size of the simulated room
 // Stereo Width: Stereo width of late reflections
 // Rev-Delay: Delay of the late reflections relative to the
 // early reflections

Nr.	Name:	sysex value range:	parameter range:	scale :
90 = STAGE		6		

Parameter :				
91 = Decay	0 - 89	= 2 - 20 s	log	
92 = HiDec Damp	0 - 100	= 0 - 100 %	lin	
93 = ER/Rev-Balance	0 - 100	= 0 - 100 %	lin	
94 = Size	1 - 49	= 1 - 50	lin	
95 = PreDelay	0 - 138	= 0 - 490 ms	log	
96 = Rev-Delay	0 - 138	= 0 - 490 ms	log	
97 = Diffusion	0 - 20	= 0 - 20	lin	
98 = Stereo Width	0 - 20	= 0 - 20	lin	

/***** Spring Reverb *****/

```
// Structure:
//
//          ----- M      G
//          /          /-- I -- A --o
// o-- FILTER -- ER -- REVERB      X      T
//          \          \-- E -- E --o
//          ----- R
//
// PreDelay:      Delays the whole reverb effect
// Decay:          Reverb time
// HiDec Damp:     Damping of high frequencies in %
// HiDec Freq:     Frequency above the decay is damped
// Stereo Width:   Stereo spread of the late reflections
// HiShv Freq:     Frequency of the input high-shelver
// Hi-Shv Damp:    Damping input high-shelver
// Metal Res.:     Adds a metal-type resonance
```

Nr.	Name:	sysex value range:	parameter range:	scale :
90 = SPRING REVERB		7		

Parameter :				
91 = Decay	0 - 36	= 2 - 5 s	log	
92 = HiDec Damp	0 - 100	= 0 - 100 %	lin	
93 = HiDec Freq	0 - 106	= 0.2 - 20 KHz	log	
94 = Stereo Width	0 - 20	= 0 - 20	lin	
95 = PreDelay	0 - 138	= 0 - 490 ms	log	
96 = Metal Res.	0 - 20	= 0 - 20	lin	
97 = HiShv Freq	0 - 68	= 1 - 20 KHz	log	
98 = Hi-Shv Damp	0 - 30	= 0 - 30 dB	lin	

/***** Gated Reverb *****/

```
// Structure:
//
//          ----- M      G
//          /          /-- I -- A --o
// o-- FILTER -- ER -- REVERB      X      T
//          \          \-- E -- E --o
//          ----- R
//
// PreDelay:      Delays the whole reverb effect
// Decay:          Reverb time
// HiDec Damp:     Damping of high frequencies in %
// Diffusion:      Density of the late reflections
// Stereo Width:   Stereo spread of the late reflections
// Gate Thresh:    Threshold for the gate
// Gate Hold:      Hold time for the gate
// Gate Resp:      Attack/Release time for the gate
```

Nr.	Name:	sysex value range:	parameter range:	scale :
90 = GATED REVERB 8				

Parameter :				
91 = Decay	0 - 90	= 1 - 10 s	log	
92 = HiDec Damp	0 - 100	= 0 - 100 %	lin	

93 = Diffusion	0 - 20	= 0 - 20	lin
94 = Stereo Width	0 - 20	= 0 - 20	lin
95 = PreDelay	0 - 138	= 0 - 490 ms	log
96 = Gate Thresh	0 - 60	= -60 - 0 dB	lin
97 = Gate Hold	0 - 156	= 10 - 1000 ms	log
98 = Gate Resp	0 - 101	= 2 - 200 ms	log

/***** Stereo Delay

*****/

// Structure:

```
//
//      +-+ DELAY_L ----->---*--->-o
//      /  |
//      /  -- FB_L <- LP/HP <-
// o--
//      \  -- FB_R <- LP/HP <-
//      \  |
//      +-+ DELAY_R ----->---*--->-o
//
```

// Delay: Delay time

// Feedback: Feedback Level

// Feedback-HP: Cut Frequency of the Feedback High pass

// Feedback-LP: Cut Frequency of the Feedback Low pass

Nr.	Name:	sysex value range:	parameter range:	scale :
-----	-------	--------------------	------------------	---------

90 = STEREO DELAY 9

Parameter :

91 = Delay L	0 - 2700	= 0 - 2700 ms	lin
92 = Delay R	0 - 2700	= 0 - 2700 ms	lin
93 = Feedback L	0 - 99	= 0 - 99 %	lin
94 = Feedback R	0 - 99	= 0 - 99 %	lin
95 = Feedback-HP	0 - 144	= 20 Hz - 10 KHz	log
96 = Feedback-LP	0 - 122	= 100 Hz - 20 KHz	log
97 = -			
98 = -			

/***** Echo *****/

// Structure:

```
//
//      +-----+ DELAY_L ----->-----*--->-o
//      /      |
//      /      -- FB <- LP/HP <- F_DELAY_L <-
// o---
//      \      |
//      \      -- FB <- LP/HP <- F_DELAY_R <-
//      \      |
//      -- IG +- DELAY_R ----->-----*--->-o
//
```

// Delay: Delay time

// Feedback Delay: Length of the Feedback Delay

// Feedback: Feedback Level

// Feedback-HP: Cut Frequency of the Feed. High pass

// Feedback-LP: Cut Frequency of the Feed. Low pass

// Input Gain-R: Input Gain of the Right Delay

Nr.	Name:	sysex value range:	parameter range:	scale :
-----	-------	--------------------	------------------	---------

90 = ECHO 10

Parameter :

91 = Delay L	0 - 1800	= 0 - 1800 ms	lin
92 = Delay R	0 - 1800	= 0 - 1800 ms	lin
93 = Feedback Del.L	0 - 162	= 0 - 900 ms	log
94 = Feedback Del.R	0 - 162	= 0 - 900 ms	log

95 = Feedback-HP	0 - 144	= 20 Hz - 10 KHz	log
96 = Feedback-LP	0 - 122	= 100 Hz - 20 KHz	log
97 = Feedback	0 - 99	= 0 - 99 %	lin
98 = Input Gain-R	0 - 100	= 0 -100 %	lin

/***** Stereo Chorus *****/

// Structure:

```
//
//      .- PITCH ----->---o
//      |      |
//      |      (45/90/180°)
//      |      |
//      |      LFO (~,/\/)
//      |      |
// o-----+- PITCH ----->---o
//
```

//
// Wave: Waveform of the Oscillator (Sine, Triangular)
// LFO Speed: Speed of the Oscillator
// Mod Depth: Depth of the Modulation

// Mod Delay: Delay length of the Modulation
// Ste Phase: Stereo LFO Offset Angle

Nr.	Name:	sysex value range:	parameter range:	scale :
90 = STEREO CHORUS		11		
Parameter :				
91 = Wave,	0 - 1	= Tri , Sine	switch	
92 = LFO Speed	0 - 94	= 0.05 - 20 KHz	log	
93 = Mod Depth	0 - 100	= 0 - 100 %	lin	
94 = Mod Delay	0 - 99	= 5 - 100 ms	log	
95 = Ste Phase	0 - 2	= 45,90,180 dgr	switch	
96 = -				
97 = -				
98 = -				

/***** Stereo Flanger *****/

// Structure:

```
//
//      -- FB---<- LP -<-
//      |      |
//      +- PITCH ----->---*--->-o
//      |      |
//      |      (45/90/180°)
//      |      |
//      |      LFO (~,/\/)
//      |      |
// o-----+- PITCH ----->---*--->-o
//      |      |
//      -- FB---<- LP -<-
//
```

//
// Wave: Waveform of the Oscillator (Sine, Triangular)
// LFO Speed: Speed of the Oscillator
// Mod Depth: Depth of the Modulation
// Mod Delay: Delay length of the Modulation
// Feedback: Feedback Level

```
// Feed-LP: Cut Frequency of the Feedback Low pass
// Ste Phase: Stereo LFO Offset Angle
```

Nr.	Name:	sysex value range:	parameter range:	scale :
90	= STEREO FLANGER	12		
Parameter :				
91	= Wave	0 - 1	= Tri , Sine	switch
92	= LFO Speed	0 - 94	= 0.05 - 20 Hz	log
93	= Mod Depth	0 - 100	= 0 - 100 %	lin
94	= Mod Delay	0 - 99	= 0.5 - 50 ms	log
95	= Feedback	0 - 198	= -99 - +99 %	lin
96	= Feed-LP	0 - 106	= 0.2 - 20 KHz	log
97	= Ste Phase	0 - 2	= 45,90,180 dgr	switch
98	= -			

```
/***** Stereo Phaser *****/
```

```
// Structure:
```

```
//
//      -- FB----<-----
//      |                               |
//      +- PHASE_SHIFT -->-*-->-o
//      |                               |
//      | (0..180°)
//      |                               |
//      | LFO
//      |                               |
// o-----+- PHASE_SHIFT -->-*-->-o
//      |                               |
//      --- FB----<-----
//
```

```
//
// Speed: Speed of the Oscillator
// Stages: Amount of Phase Shift
// Depth: Depth of the Modulation
// Feedback: Feedback Level
// Ste Phase: Stereo LFO Offset Angle
```

Nr.	Name:	sysex value range:	parameter range:	scale :
90	= STEREO PHASER	13		
Parameter :				
91	= Stages	2 - 9	= 2 - 9	lin
92	= Speed	0 - 76	= 0.1 - 14 Hz	log
93	= Depth	0 - 100	= 0 - 100 %	lin
94	= Feedback	0 - 198	= -99 - +99 %	lin
95	= Ste Phase	0 - 180	= 0 - 180 dgr	lin
96	= -			
97	= -			
98	= -			

```
/***** Pitch Shifter
```

```
*****/
```

```
// Structure:
```

```
//
// o--+- PITCH_SHIFT -- DELAY -*-->-o
//      |                               |
//      - FB --<-----<-----
//
```

```
// Semitones: Pitch Shift in Semitones
```

```
// Cents:      Additional Pitch Shift in Cents
// Delay:      Delay time
// Feedback:    Feedback Level
```

Nr.	Name:	sysex value range:	parameter range:	scale :
90 = PITCH SHIFTER		14		
Parameter :				
91 = Semitones		0 - 24	= -12 - +12	lin
92 = Cents		0 - 100	= -50 - +50	lin
93 = Delay		0 - 158	= 0 - 800 ms	log
94 = Feedback		0 - 80	= 0 - 80 %	lin
95 = -				
96 = -				
97 = -				
98 = -				

```
/****** Delay *****/
// Structure:
//
// o-----+ DELAY_L ----->---*--->-o
//      |                               |
//      -- FB---<- LP/HP -<-
//
// Delay:      Delay time
// Feedback:    Feedback Level
// Feedback-HP: Cut Frequency of the Feed. High pass
// Feedback-LP: Cut Frequency of the Feed. Low pass
```

Nr.	Name:	sysex value range:	parameter range:	scale :
90 = DELAY		15		
Parameter :				
91 = Delay		0 - 1800	= 0 - 1800 ms	lin
92 = Feedback		0 - 99	= 0 - 99 %	lin
93 = Feedback-HP		0 - 144	= 20 Hz - 10 KHz	log
94 = Feedback-LP		0 - 122	= 100 Hz - 20 KHz	log
95 = -				
96 = -				
97 = -				
98 = -				

```
/****** Flanger *****/
// Structure:
//
//      LFO (~,/\/)
//      |
// o-----+ PITCH ----->---*--->-o
//      |                               |
//      -- FB---<- LP -<-
//
// Wave:      Waveform of the Oscillator (Sine, Triangular)
// LFO Speed:  Speed of the Oscillator
// Mod Depth:  Depth of the Modulation
// Mod Delay:  Delay length of the Modulation
// Feedback:   Feedback Level
// Feed-LP:    Cut Frequency of the Feedback Low pass
```

Nr.	Name:	sysex value range:	parameter range:	scale :
90 = FLANGER		16		
Parameter :				
91 = Wave		0 - 1	= Tri , Sine	switch
92 = LFO Speed		0 - 94	= 0.05 - 20 Hz	log

93 = Mod Depth	0 - 100	= 0 - 100 %	lin
94 = Mod Delay	0 - 99	= 0.5 - 50 ms	log
95 = Feedback	0 - 198	= -99 - +99 %	lin
96 = Feed-LP	0 - 106	= 0.2 - 20 KHz	log
97 = -			
98 = -			

/****** Chorus *****/

// Structure:

//

// LFO (~,/\\/)

//

// o-----+ PITCH ----->---o

//

// Wave: Waveform of the Oscillator (Sine, Triangular)

// LFO Speed: Speed of the Oscillator

// Mod Depth: Depth of the Modulation

// Mod Delay: Delay length of the Modulation

Nr.	Name:	sysex value range:	parameter range:	scale :
90 = CHORUS		17		
Parameter :				
91 = Wave		0 - 1	= Tri , Sine	switch
92 = LFO Speed		0 - 94	= 0.05 - 20 KHz	log
93 = Mod Depth		0 - 100	= 0 - 100 %	lin
94 = Mod Delay		0 - 99	= 5 - 100 ms	log
95 = -				
96 = -				
97 = -				
98 = -				

/****** Phaser *****/

// Structure:

//

// LFO

//

// o-----+ PHASE_SHIFT -->*->--o

//

// --- FB-----<-----

//

// Speed: Speed of the Oscillator

// Stages: Amount of Phase Shift

// Depth: Depth of the Modulation

// Feedback: Feedback Level

Nr.	Name:	sysex value range:	parameter range:	scale :
90 = PHASER		18		
Parameter :				
91 = Stages		2 - 7	= 2 - 7	lin
92 = Speed		0 - 76	= 0.1 - 14 Hz	log
93 = Depth		0 - 100	= 0 - 100 %	lin
94 = Feedback		0 - 198	= -99 - +99 %	lin
95 = -				
96 = -				
97 = -				
98 = -				

/****** Tremolo *****/

// Structure:

//

// LFO (~,/\\/,|_|)

```
//
//  o----| \ /
//      | >----->--o
//      | /
//
//
// Wave:      Waveform of the Oscillator (Sine, Triangular, Square)
// Speed:      Speed of the Oscillator
// Depth:      Depth of the Amplitude Modulation
```

Nr.	Name:	sysex value range:	parameter range:	scale :
90 = TREMOLO		19		
Parameter :				
91 = Wave		0 - 2	= Sine,Tri,Square switch	
92 = Speed		0 - 94	= 0.05 - 20 Hz	log
93 = Depth		0 - 100	= 0 - 100 %	lin
94 = -				
95 = -				
96 = -				
97 = -				
98 = -				

```
/***** Autopan *****/
// Structure:
//
//  o--*--| \
//      | | \
//      | 180°-- LFO (~,/\/,|_|_)
//      |  /
//      | \
//  ---| >----->--o
//      | /
//
// Wave:      Waveform of the Oscillator (Sine,Triangular,Square)
// Speed:      Speed of the Oscillator
// Depth:      Depth of the Amplitude Modulation
```

Nr.	Name:	sysex value range:	parameter range:	scale :
90 = AUTOPAN		20		
Parameter :				
91 = Wave		0 - 2	= Sine,Tri,Square switch	
92 = Speed		0 - 94	= 0.05 - 20 Hz	log
93 = Depth		0 - 100	= 0 - 100 %	lin
94 = -				
95 = -				
96 = -				
97 = -				
98 = -				

```
/***** Enhancer *****/
// Structure:
//
//      --- Proc -|>--
//      |         |
//  o----*-- High -*-----+-- NR ---+--o
//      |                                     |
//      -- Bass Proc. -----|>-----
//
//
```

```
// Hgh-Freq: HP - Frequency
// Hgh-Q: HP - Q
// Process: Amount of High Processing
// NR-Thresh: Noise Reduction Threshold
// NR-Resp: Noise Reduction Speed
// Bass-Freq: Bass Processor - Freq.
// Bass-Q: Bass Processor - Q
// Bass-Level: Bass Processor - Level
```

Nr.	Name:	sysex value range:	parameter range:	scale :
90	= ENHANCER	21		
Parameter :				
91	= Hgh-Freq	0 - 57	= 1 - 12 kHz	log
92	= Hgh-Q	0 - 30	= 1 - 4	lin
93	= Process	0 - 100	= 0 - 100 %	lin
94	= NR-Resp	0 - 110	= 20 - 400 ms	log
95	= Bass-Freq	0 - 53	= 50 - 500 Hz	log
96	= Bass-Q	0 - 30	= 1 - 4	lin
97	= Bass-Level	0 - 100	= 0 - 100 %	lin
98	= NR-Thresh	0 - 90	= -90 - 0 dB	lin

/***** Graphic EQ *****/

Nr.	Name:	sysex value range:	parameter range:	scale :
90	= GRAPHIC EQ	22		
Parameter :				
91	= 50 Hz	0 - 60	= -15 - +15 dB	lin
92	= 250 Hz	0 - 60	= -15 - +15 dB	lin
93	= 1.5 kHz	0 - 60	= -15 - +15 dB	lin
94	= 7 kHz	0 - 60	= -15 - +15 dB	lin
95	= 100 Hz	0 - 60	= -15 - +15 dB	lin
96	= 500 Hz	0 - 60	= -15 - +15 dB	lin
97	= 3.5 kHz	0 - 60	= -15 - +15 dB	lin
98	= 14 kHz	0 - 60	= -15 - +15 dB	lin

/***** LFO-Filter *****/

```
// Structure:
//
//          LFO (~,/\/, _|^-)
//          |
// o----- BP/LP/HP ----->---o
```

```
//
// Speed:      LFO Speed
// Wave:       LFO Wave Form
// Slewing:    Square Wave Sharpness
// Base Freq:  Filter Bottom Frequency
// Depth      Filter Freq. Modulation Depth
// Filter-Mode: Low pass, High pass, Band pass
// Filter-Q:   Filter Resonance
```

Nr.	Name:	sysex value range:	parameter range:	scale :
90	= LFO FILTER	23		
Parameter :				
91	= Speed	0 - 105	= 0.05 - 40 Hz	log
92	= Wave	0 - 2	= Sine,Tri,Square	switch
93	= Base Freq	0 - 100	= 100 Hz - 10 KHz	log
94	= Depth	0 - 100	= 0 - 100 %	lin
95	= -			
96	= Slewing	0 - 48	= 1 - 50 ms	log

97 = Filter-Mode	0 - 2	= HP, BP, LP	switch
98 = Filter-Q	0 - 49	= 1 - 20	log

/***** Auto-Filter *****/

// Structure:

//

// --> ENV -->

// |

// o----*----- BP/LP/HP ---->--o

//

// Base Freq: Filter Bottom Frequency

// Sensitivity: Envelope Modulation Depth

// Attack: Envelope Attack Time

// Release: Envelope Release Time

// Filter-Mode: Low pass, High pass, Band pass

// Filter-Q: Filter Resonance

Nr.	Name:	sysex value range:	parameter range:	scale :
90 = AUTO FILTER	24			
Parameter :				
91 = Base Freq		0 - 100	= 100 Hz - 10 KHz	log
92 = Sensitivity		0 - 100	= 0 - 100 %	lin
93 = Attack		0 - 156	= 10 - 1000 ms	log
94 = Release		0 - 156	= 10 - 1000 ms	log
95 = Filter-Mode		0 - 2	= HP, BP, LP	switch
96 = Filter-Q		0 - 49	= 1 - 20	log
97 = -				
98 = -				

/***** LoFi *****/

// Structure:

//

// Pink Noise -- LP - HP --|>---

// |

// o----- Bit Mask - LP - HP -----+---o

// |

// Buzz --|>---

//

// Bits: Signal Resolution

// Signal-HP: Signal High pass

// Signal-LP: Signal Low pass

// Noise-Gn: Noise Level

// Noise-HP: Noise High pass

// Noise-LP: Noise Low pass

// Buzz-Gn: Buzz Level

// Buzz-Freq: Buzz Frequency

Nr.	Name:	sysex value range:	parameter range:	scale :
90 = LOWFI		25		
Parameter :				
91 = Bits		0 - 6	= 6 - 16	log
92 = Noise-Gn		0 - 100	= 0 - 100 %	lin
93 = Noise-HP		0 - 154	= 20 Hz - 16 KHz	log
94 = Noise-LP		0 - 106	= 0.2 - 20 KHz	log
95 = Signal-HP		0 - 154	= 20 Hz - 16 KHz	log
96 = Signal-LP		0 - 121	= 0.1 - 20 KHz	log
97 = Buzz-Gn		0 - 100	= 0 - 100 Hz	lin

98 = Buzz-Freq 0 - 1 = 50, 60 Hz switch

/***** Ring Modulator *****/

// Structure:

```
//
// (~,/\/, _| ) LFO --|>---
//
//      o---*----- AM-Mod -- LP --o
//      |
//      -- ENV --|>---
```

```
//
// Mod.-Mode:      LFO Modulation Mode
// LFO-Speed:      LFO Frequency
// Env-Response:   Envelop Attack/Release time
// AM-Carrier Freq.: AM Frequency
// AM-Depth:      AM Modulation Depth
// Modul.-Depth:   LFO Env-Modulation Depth
// Band limit:     Signal Low pass Freq.
```

Nr.	Name:	sysex value range:	parameter range:	scale :
90 = RING MODULATOR		26		
Parameter :				
91 = Mod.-Mode		0 - 3	= Sine, Tri ,Square, Env	switch
92 = LFO-Speed		0 - 107	= 0.1 - 100 Hz	log
93 = AM-Carrier Freq.		0 - 106	= 0.1 - 10 KHz	log
94 = Band limit		0 - 121	= 0.1 - 20 KHz	log
95 = Modul.-Depth		0 - 100	= 0 - 100 %	lin
96 = Env-Response		0 - 156	= 10 - 1000 ms	log
97 = AM-Depth		0 - 100	= 0 - 100 %	lin
98 = -				

```

*****
MIDI File dump Protocol   ( RS232 )
*****

*****
Header :
*****

F0          System ex
00      0 = Manufact ID 2 bytes, 7E = USEM none Real Time, 7F = USEM Real Time
20      Behr. Man Id
32      "
ic          MIDI channel info
            i = 0AB0, A=1 ignore app ID, B=1 ignore midi channel ( omni )
            c = MIDI channel 0..F ( 1..16 )
dd          Apparatus id , 0B for DD32
rf          Function code: 0rffffff
            r = request bit  1= request 0= here's the data
            fffffff = function number 0..3F
            Behr. Function numbers:
                    0 = Device Id + active MIDI channel      ( we use for
connection test )
                    4 = Meter Data
                    F = Memory Dump

            We Add:
                    50/10 = Req/Dump Current Settings
                    51/11 = Req/Dump PC-card file list
                    52/12 = Req/Dump "File" from PCCARD
            Plus a 'what' Byte:
ww          =
            F_ALL = All
            F_SETUP      = Prefs and Status
            F_CHANL      = Channel Lib
            F_EQL        = EQ Lib
            F_DYNL       = Dyn Lib
            F_FXL        = FX Lib
            F_AUT         = AutoMation
            F_SNAPS      = Snaps

            So Computer says 0x50 F_ALL, and DD32 spits out 0x10 F_ALL and
all data
            Or Computer says 0x10 F_ALL, with all data and DD32 recieves
it

            So Computer says 0x51 F_ALL, and DD32 spits out 0x11 F_ALL and
all *.all filenames in data blok

            So Computer says 0x52 F_ALL + filename , and DD32 spits out
0x10 F_ALL and all data of file ( Computer knows the name name )

            So Computer says 0x12 F_ALL + filename , and DD32 spits out
0x52 F_ALL and filename
            ( DD32 now knows the filename ) and Computer spits out 0x10
F_ALL and all data of file

-----
            50/10 = Req/Dump Current Settings
-----
When the Request bit = 0 The following bytes define the data:

```

```

vv          Data file version number      1..7F  current version = 1

hh          Total Number of data blocks, ( block size = 1000 ) hh*128+ll  ( max
+/- 14Mbyte )
ll

hh          Number of data block (0 = first) hh*128+ll
ll

dd          Byte Count number of data 00..7F
.           Decoded as 7 bytes of 7 bit data
.           and one byte of 7 bits, defining
.           the high bits of the previous 7 bytes
.           So Byte count is always modula 8
dd

cc          Check Sum = !(sum)&0x7F

F7          OEX   ( Header size without data = 15 )

```

When the Request bit = 1 The following bytes define the request:

```

hh          Number of data block (0 = first) hh*128+ll
ll

F7          OEX   ( Header size without data = 11 )

```

51/11 = Req/Dump PC-card file list

When the Request bit = 0 The following bytes define the data:

```

dd          a number of filenames each 9 byte long ( 8 char + 0 )
..          eg. "FILE_CH1""\0'
dd

F7

```

When the Request bit = 1 The following bytes define the request:

```

F7

```

52/12 = Req/Dump "File" from PCCARD

When the Request bit = 0 The following bytes define the data:

```

dd          a c-string filename eg   "FILE_CH1""\0' or "B""\0'
..
dd

F7

```

When the Request bit = 1 The following bytes define the request:

```

dd          a c-string filename eg   "FILE_CH1""\0' or "B""\0'
..
dd

```

F7

Error Handling:

On wrong check sum send a new request of that block.

Protocol :

getting a file out of the DDX3216

```
DD32          PC
Sender        Receiver = initiator
              <- REQ blok 0
Send 0 -> Check sum ok
              <- REQ 1
Send 1 -> Checksum nok
              <- REQ 1
Send 1 -> Checksum ok
              <- REQ 2
Send 2 -> Checksum ok
                        done
```

sending a file to the DDX3216

```
DD32          PC
Reciever      Sender = initiator
                        Send blok 0
Checksum
REQ1  ->
              <- Send 1
Checksum
REQ2  ->
              <- Send 2
Checksum
done
```

Test On PC version:

Make a midi.dat file with in text: (format as above REQ Dump)

```
F0 00 20 32 00 0B 50 01 00 00 F7
F0 00 20 32 00 0B 50 01 00 01 F7
F0 00 20 32 00 0B 50 01 00 02 F7
F0 00 20 32 00 0B 50 01 00 03 F7
```

,
,

```
F0 00 20 32 00 0B 50 01 00 0F F7
```

Run dd32pc an pres F4 on keyboard

exit dd32pc

there must be a file called midi.aat with 16 bloks :

F0 F7 F0....F7 etc.

rename this file to midi.dat

run dd32pc again, press F4 and the file should be correctly loaded.

For RS232 the same, but: rs232.dat and F3

--/20 = do direct par change

All changed controllers are sent per frame within one system exclusive header
After the function code we have

nn number of changed parameters (min = 1, max = 23 / frame)

dd A series of 4 bytes per parameter: 1e = module (channel) number

dd 2e = parameter number

dd 3e = parameter high 7 bit parameter value is 1:1

dd 4e = parameter low 7 bit

..

dd Last parameter

dd

dd

dd

F7

--/22 = do (group)channel attenuator

All changed controllers are sent per frame within one system exclusive header
After the function code we have

nn number of changed parameters (min = 1, max = 23 / frame)

dd A series of 3 bytes per parameter: 1e = channel nr 0= chan 1 (attenuates
all channels in same mute group)

dd 2e = parameter high 7 bit parameter value is 1:1

dd 3e = parameter low 7 bit

..

dd Last parameter

dd

dd

F7

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BEHRINGER Spezielle Studiotechnik GmbH, Hanns-Martin-Schleyer-Str. 36-38, 47877 Willich-Münchheide II, Germany
Tel. +49 (0) 21 54 / 92 06-0, Fax +49 (0) 21 54 / 92 06-30